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# ANALYSIS OF SMALL-SYSTEMS SERVICE

# NCR CORPORATION

INPUT®

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# Exhibits

# Exhibits (Continued)

# Introduction

# Introduction

## A

## Scope

The purpose of this report is to provide a detailed analysis of responses from users of the National Cash Register (NCR) TOWER systems regarding their requirements and how well the NCR products and services are meeting those requirements. The key areas analyzed are as follows:

- System Availability
- System Interruptions
- Hardware support
- Software support
- Ancillary services

This report also provides information on contract coverage hours and the key reasons users choose service vendors.

Similar information gathered from users of eight other vendors is provided in summary form for comparison with the NCR results.

## B

## Methodology

For this report INPUT first surveyed forty users of NCR TOWER systems to determine their requirement for and satisfaction with a wide range of services. INPUT targeted leading Information Systems (IS) officials for interviews. Each interview was performed by telephone and lasted approximately thirty minutes. INPUT feels that telephone surveying has obvious benefits over mailed surveys, such as knowledge of and control over the respondents, and the ability to follow up on responses.

After the interview process was completed, the data were entered into a dBASE III Plus (Ashton Tate Corporation) data base, run through quality control tests, and analyzed using the statistical analysis package ABstat (Anderson Bell). During analysis, additional quality control was performed to ensure data integrity.

As a result of the data analysis of the first forty surveys, a decision was made to survey forty additional users. This was done in order to improve the statistical confidence of the results. The results of each survey are presented in Chapters III and IV and the results of both surveys combined are presented in chapter V.

Chapter VI contains the consolidated results of 399 interviews conducted with users of AT&T, Concurrent, Data General, DEC, Hewlett Packard, IBM, Prime and Wang Mid-Range systems.

INPUT calculates the percent of satisfied users by examining the responses to each question that asks what level of service the user requires and what level of service the user receives. If the user receives a level of service equal to or greater than what is required, the user is satisfied.

A copy of the survey questions used in the report is included in the appendix.


# Executive Overview

# Executive Overview

INPUT interviewed a total of eighty users of the NCR TOWER systems to gain information for this report. This was done with two surveys, each of forty users. The second survey was conducted to improve the statistical confidence of the results. Separate results are presented for each survey as well as for the two surveys combined. The results of another INPUT survey of three hundred ninety-nine users of other vendors' products are also displayed for comparison.

The major differences between the types of users in the NCR surveys were that in the first survey 45% of the users were from the medical industry, and in the second survey, 58% were from the medical industry. In addition, in the first survey 23% of the users were from the services industry, while in the second survey only 5% of the users were from the services industry.

Sixty-five percent of the NCR users have Monday through Friday contract coverage and sixty-three percent have only one shift of contract coverage.

The NCR users surveyed rate service quality and system availability the two most important factors in selecting a service vendor. These are the same two items selected by the users of all other vendors as being the most important.

## A

## System Interruptions and Availability

NCR TOWER users report a lower number of system interruptions per month, and a lower percent of these interruptions due to hardware, than the average of all other vendors combined. Exhibit II-1 illustrates that the number of system interruptions varied widely between the NCR #1 sample and the NCR #2 sample, but the combined surveys report an interruption rate of .45 per month versus a .59 per month for all other vendors combined. The percent of interruptions due to hardware is 56% for NCR versus 63% for all other vendors combined.

EXHIBIT II-1

## SYSTEM INTERRUPTIONS AND AVAILABILITY

| | NCR #1 | NCR #2 | NCR Combined | All Other Vendors |
|---|---|---|---|---|
| Percent System Availability Required | 98.6 | 97.3 | 97.9 | 97.5 |
| Percent System Availability Received | 96.9 | 97.4 | 97.1 | 97.4 |
| Percent Satisfied | 30.0 | 58.0 | 45.0 | 56.0 |
| Number of System Interruptions/MO | 0.62 | 0.28 | .045 | 0.59 |
| Percent Hardware | 54 | 57 | 56 | 63 |
| Percent System Software | 18 | 11 | 15 | 13 |
| Percent Application Software | 10 | 8 | 9 | 4 |
| Percent Other | 18 | 24 | 20 | 20 |

The mean system availability required and received are very similar between the NCR TOWER combined sample and the sample of all other vendors combined. This is based on the standard error of the means obtained from both samples. NCR rates slightly higher on system availability required (97.9% vs. 97.5%) and slightly lower on system availability received (97.1% vs. 97.4%).

NCR is lower in the percent of users satisfied with system availability (45% vs. 56%). A closer examination of this data reveals that 83% of NCR users required a system availability of 99% or higher while only 60% of all other vendors combined required a 99% or higher system availability. NCR satisfied 34% of these users while the other vendors satisfied 36%. It is clear that system availability is a high customer priority and that both NCR and the other vendors need to take appropriate action to improve customer satisfaction in this area. NCR has to work harder to satisfy these needs since its users are more demanding.

## B

### Hardware Support

The key hardware support items are displayed in Exhibit II-2. NCR users require an average response time of 3.4 hours as compared to a 4.5 hour response time for all other vendors combined. NCR users report that they are receiving a 4.8 hour average response time versus 3.9 hours for all other vendors combined. Nineteen of the 80 NCR users surveyed listed response time as their key concern.

EXHIBIT II-2

**HARDWARE SUPPORT**

| | NCR #1 | NCR #2 | NCR Combined | All Other Vendors |
|---|---|---|---|---|
| Response Time Required | 3.1 | 3.7 | 3.4 | 4.5 |
| Response Time Received | 3.6 | 6.1 | 4.8 | 3.9 |
| Percent Satisfied | 76 | 74 | 75 | 90 |
| Repair Time Required | 3.8 | 5.0 | 4.4 | 4.7 |
| Repair Time Received | 7.3 | 6.7 | 6.9 | 4.0 |
| Percent Satisfied | 69 | 74 | 72 | 91 |
| Spare Parts Availability Required | 9.6 | 9.2 | 9.4 | 8.8 |
| Spare Parts Availability Received | 7.5 | 8.1 | 7.8 | 8.1 |
| Percent Satisfied | 19 | 49 | 34 | 46 |
| HW Maintenance Overall Required | 9.7 | 9.3 | 9.5 | 9.0 |
| HW Maintenance Overall Received | 8.3 | 8.6 | 8.5 | 8.5 |
| Percent Satisfied | 24 | 58 | 41 | 59 |

Repair time required for NCR users was 4.4 hours, compared to 4.7 hours for all other vendors combined. NCR repair time received was significantly higher (6.9 hours) than the time reported for all other vendors combined (4.0 hours). The NCR responses included three users who reported 48-hour repair time. Two of these were in the first survey and one in the second survey. The percent of users satisfied with response time (72%) is significantly lower than the average for all other vendors combined (91%).

NCR users have a higher requirement for spare parts availability yet report a lower parts availability received than the average of all other users combined. This results in only 34% of the NCR users being satisfied with parts availability. In the first NCR survey only 19% of the users were satisfied.

A final group of questions in the hardware support area asked users to define their overall requirements for hardware support and to give their perception of how well the vendors were meeting those requirements. NCR users are more demanding in terms of requirements than all other vendors combined (9.5 versus 9.0) and they report the same level of hardware support received (8.5) as all other vendors combined. The resulting percent of satisfied users is 41% for NCR and 59% for all other vendors combined.

## C

## Software Support

Exhibit II-3 reveals that NCR users are more demanding in terms of requirements for software support than the average of all other vendors combined. This is true for overall software support as well as for all of the key elements of software support. NCR is lower than all other vendors combined in two areas of software service received: software documentation and software operational training.

The percent of satisfied NCR users is much lower in all areas than all other vendors combined. The key reason for this appears to be that in the area of software documentation, only 32% of the users are satisfied.

EXHIBIT II-3

## SOFTWARE SUPPORT

| | NCR #1 | NCR #2 | NCR Combined | All Other Vendors |
|---|---|---|---|---|
| SW Engineer Skill Required | 9.4 | 8.8 | 9.2 | 8.7 |
| SW Engineer Skill Received | 7.8 | 8.4 | 8.0 | 7.5 |
| Percent Satisfied | 38 | 73 | 50 | 57 |
| SW Remote Support Required | 9.2 | 9.0 | 9.1 | 8.0 |
| SW Remote Support Received | 7.6 | 8.6 | 7.9 | 7.1 |
| Percent Satisfied | 32 | 70 | 45 | 55 |
| SW Documentation Required | 9.3 | 8.9 | 9.1 | 8.4 |
| SW Documentation Received | 6.3 | 7.8 | 6.8 | 7.2 |
| Percent Satisfied | 20 | 55 | 32 | 47 |
| SW Operational Training Required | 7.6 | 8.6 | 7.9 | 7.1 |
| SW Operational Training Received | 5.4 | 6.7 | 5.8 | 6.3 |
| Percent Satisfied | 38 | 33 | 38 | 61 |
| SW Support Required | 9.4 | 9.2 | 9.3 | 8.5 |
| SW Support Received | 7.1 | 8.5 | 7.6 | 7.5 |
| Percent Satisfied | 21 | 55 | 33 | 51 |

## D

### Ancillary Services

Exhibit II-4 displays survey results pertaining to ancillary services; again, with the exception of Install/Deinstall requirements, NCR users have higher requirements than all other vendors combined. NCR, however, does a much better job of meeting ancillary requirements, and as a result the percent of satisfied users is very similar to that of all other vendors.

The analysis above compares NCR performance with the average of the performance of all other vendors combined. Clearly NCR should have the objective of being a leader. If the NCR results are examined in that light, the following information is key:

Percent of Users Satisfied with System Availability:

| | |
|---|---|
| NCR | 45% |
| IBM 9370 | 74% |

Average Response Time Received:

| | |
|---|---|
| NCR | 4.8 hours |
| IBM AS/400 | 1.0 hours |

Average Repair Time Received:

| | |
|---|---|
| NCR | 6.9 hours |
| HP | 1.9 hours |

## E

### Recommendations

Clearly, high system availability is a customer requirement that needs more attention. NCR needs to work with its customers to understand their individual needs, with the objective of improving satisfaction with system availability.

Key measurements should be put in place or emphasized in the areas of response time, repair time and parts availability at the branch office level. Incremental adjustments to manpower, training and logistic plans may be required in addition to the measurement emphasis.

In the software area the key focus items should be software documentation and software operational training.

EXHIBIT II-4

## ANCILLARY SERVICES

| | NCR #1 | NCR #2 | NCR Combined | All Other Vendors |
|---|---|---|---|---|
| Maintenance Training Required | 6.5 | 6.1 | 6.3 | 5.5 |
| Maintenance Training Received | 5.1 | 6.0 | 5.5 | 4.7 |
| Percent Satisfied | 56 | 70 | 62 | 65 |
| Pre-Installation Planning Required | 7.4 | 7.8 | 7.6 | 7.4 |
| Pre-Installation Planning Received | 5.6 | 7.4 | 6.4 | 6.8 |
| Percent Satisfied | 70 | 70 | 70 | 60 |
| Consulting Required | 6.8 | 8.4 | 7.3 | 6.3 |
| Consulting Received | 5.7 | 8.1 | 6.5 | 5.8 |
| Percent Satisfied | 66 | 75 | 69 | 70 |
| Install/Deinstall Required | 8.0 | 7.7 | 7.9 | 8.1 |
| Install/Deinstall Received | 6.9 | 7.7 | 7.3 | 7.5 |
| Percent Satisfied | 55 | 87 | 69 | 68 |
| Network Design/Planning Required | 6.4 | 8.3 | 7.1 | 6.6 |
| Network Design/Planning Received | 5.3 | 6.5 | 5.7 | 5.8 |
| Percent Satisfied | 65 | 57 | 63 | 65 |
| Ancillary Services Overall Required | 7.8 | 7.8 | 7.8 | 7.8 |
| Ancillary Services Overall Received | 6.7 | 7.0 | 6.9 | 7.0 |
| Percent Satisfied | 60 | 58 | 59 | 60 |

Network design and planning should be the key focus item in the area of ancillary services.

# NCR Survey #1

# NCR Survey # 1

Forty users of the NCR TOWER systems were surveyed. Thirty-six were users of the 32-600, two were users of the 32-650, one was a user of the 32-400, and one a user of the 32-800.

Eighteen of the users were from the medical industry, nine from the services industry and five were from the process manufacturing industry. The remaining were from education, finance, and other industries.

Service quality was rated as the most important item in selecting a service vendor, followed closely by system availability and response time, as Exhibit III-1 shows.

EXHIBIT III-1

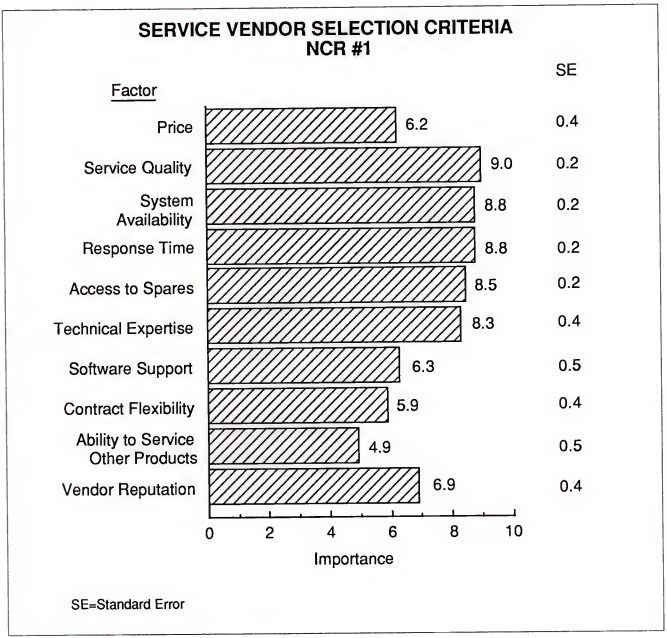



Exhibit III-2 displays the fact that about seventy percent of the sample are one-shift Monday through Friday users, and the remaining thirty percent operate seven days per week on a twenty-four hour basis.

EXHIBIT III-2

**CONTRACT COVERAGE**
**NCR #1**

| | 1989 Percent of Sample | 1988 Percent of Sample |
|---|---|---|
| Days Covered | | |
| Monday - Friday | 70 | * |
| Monday - Saturday | 0 | * |
| Monday - Sunday | 30 | * |
| Hours Covered | | |
| 1 - 9 Hours | 72 | * |
| 10 - 16 | 0 | * |
| 17 - 24 | 28 | * |

* Not Available

The average number of system interruptions per month (.6) is about twice the number reported by the other NCR sample, but is about the same as that reported by all other vendors combined, shown in Exhibit III-3. Fifty-four percent of the interruptions are caused by hardware problems.

EXHIBIT III-3

**SYSTEM INTERRUPTION ANALYSIS**
**NCR #1**

| | 1989 | | 1988 | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Interruptions per Month | 0.6 | 0.2 | * | - |
| Hardware-Caused (%) | 54 | 7.8 | * | - |
| System-Software-Caused (%) | 18 | 5.4 | * | - |
| Application-Software-Caused (%) | 10 | 4.4 | * | - |
| Other-Caused (%) | 18 | 5.9 | * | - |

SE=Standard Error

* Not available

Exhibit III-4 presents an analysis of system availability performance. NCR users require a mean system availability of 98.6% and they perceive that they are receiving 96.9%. Response time and repair time received are also longer than the customer requirements. The average repair time received, of 7.3 hours, includes two users who each reported 48-hour repair times.

EXHIBIT III-4

**SYSTEM AVAILABILITY PERFORMANCE ANALYSIS NCR #1**

| Performance Criteria | Required | | Received | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Availability (%) | 98.6 | 0.9 | 96.9 | 0.9 |
| Response Time (Hrs.) | 3.1 | 0.6 | 3.6 | 0.7 |
| Repair Time (Hrs.) | 3.8 | 0.9 | 7.3 | 2.0 |

SE=Standard Error

The percent of users who are satisfied with system availability, response time and repair time is displayed in Exhibit III-5. The 30% of users satisfied with system availability is very low when compared with the 56% satisfied with all other vendors combined. The percent satisfied with response time and repair time is also low compared with all other vendors combined (i.e., 70% vs. 90%).

EXHIBIT III-5

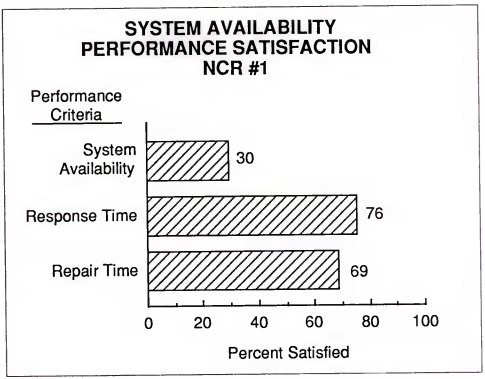
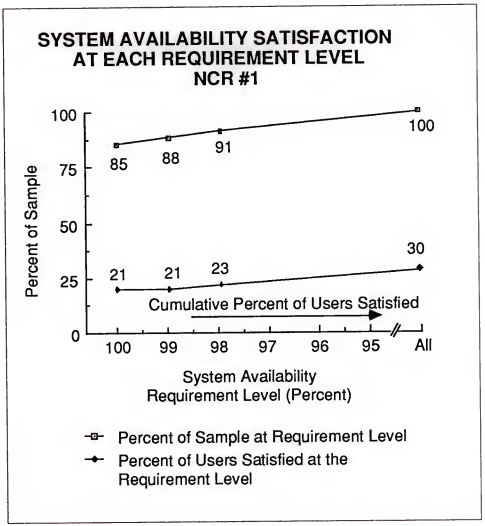


Exhibit III-6 reveals that 85% of the NCR sample requires 100% system availability and only 21% are getting it. The percent satisfied at other requirement levels is also in the low twenty percent range.

EXHIBIT III-6




Hardware maintenance requirements of the NCR sample (9.5-9.7) are all higher than the average of all of the other vendors combined (7.8-9.0). The services received in this area were all significantly below the users' requirements, as seen in Exhibit III-7.

EXHIBIT III-7

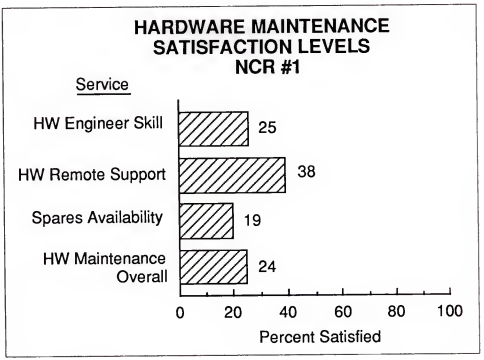
## HARDWARE MAINTENANCE REQUIRED VERSUS RECEIVED NCR #1

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | HW Engineer Skill | 9.6 | 0.1 | 8.1 | 0.2 |
| B | HW Remote Support | 9.5 | 0.1 | 7.9 | 0.3 |
| C | Spare Parts | 9.6 | 0.1 | 7.5 | 0.3 |
| D | HW Maintenance Overall | 9.7 | 0.1 | 8.3 | 0.2 |

SE=Standard Error

Exhibit III-8 displays a very low percent of satisfied users with all four hardware maintenance items. Spares availability, with only 19% satisfied, and hardware engineer skill with 25% satisfied, certainly contributed to the low overall percent satisfied of 24%.

EXHIBIT III-8



Software support requirements of the NCR sample are also higher than the average of other vendors combined. The support received falls far short of the requirements in the areas of software documentation and operational training, as evidenced in Exhibit III-9.

EXHIBIT III-9

**SOFTWARE SUPPORT REQUIRED VERSUS RECEIVED NCR #1**

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | SW Engineer Skill | 9.4 | 0.3 | 7.8 | 0.4 |
| B | SW Remote Support | 9.2 | 0.4 | 7.6 | 0.4 |
| C | SW Documentation | 9.3 | 0.3 | 6.3 | 0.5 |
| D | Operational Training | 7.6 | 0.8 | 5.4 | 0.8 |
| E | SW Support Overall | 9.4 | 0.2 | 7.1 | 0.4 |

SE=Standard Error

Software support satisfaction levels, displayed in Exhibit III-10, are also very low compared with other vendors. Software documentation at 20% satisfied is the lowest, followed by software support overall with 21% satisfied.

EXHIBIT III-10

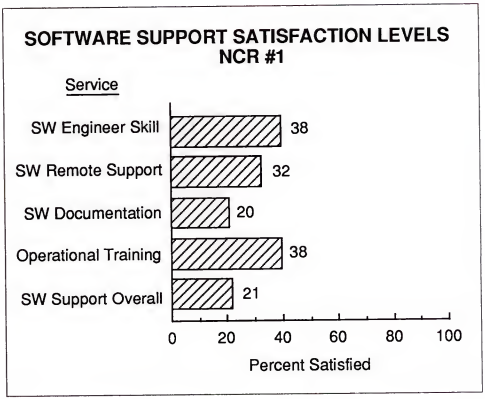



Exhibit III-11 shows that the requirement for ancillary services is not as high as for hardware maintenance and software support. Although NCR does not meet the average requirements in any of the areas, it does satisfy more than half of the users, as shown in Exhibit III-12; the percent satisfied is about the same as for all other vendors combined.

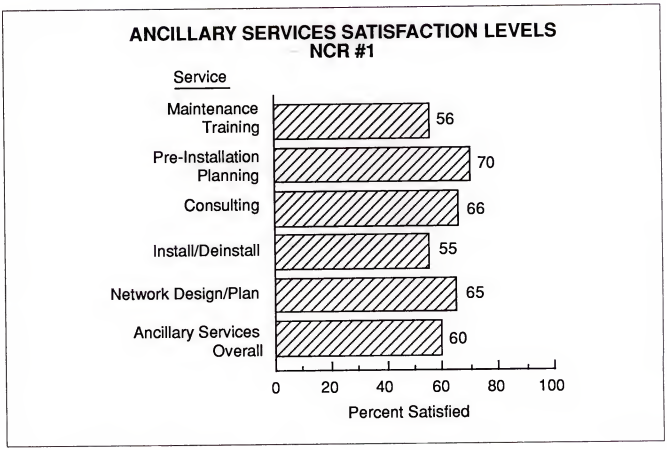
EXHIBIT III-11

## ANCILLARY SERVICES REQUIRED VERSUS RECEIVED NCR #1

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | Maintenance Training | 6.5 | 0.6 | 5.1 | 0.6 |
| B | Pre-Installation Planning | 7.4 | 0.6 | 5.6 | 0.7 |
| C | Consulting | 6.8 | 0.6 | 5.7 | 0.6 |
| D | Install/Deinstall | 8.0 | 0.5 | 6.9 | 0.6 |
| E | Network Design/ Planning | 6.4 | 0.7 | 5.3 | 0.6 |
| F | Ancillary Services Overall | 7.8 | 0.5 | 6.7 | 0.5 |

SE=Standard Error

EXHIBIT III-12



# IV

# NCR Survey #2

# NCR Survey #2

The sample for survey # 2 consisted of thirty-five users of the 32-600, three users of the 32-650, and two users of the 32-400 NCR TOWER systems.

Twenty-three of the users were from the medical industry, five from process manufacturing, and the remainder were spread evenly across the remaining industry categories.

The users in this sample rated service quality at 9.4 and technical expertise at 9.3 as the two most important reasons for selecting a service vendor, as shown in Exhibit IV-1. System availability, which was rated 9.1, was therefore considered the third most important item in service vendor selection.

EXHIBIT IV-1

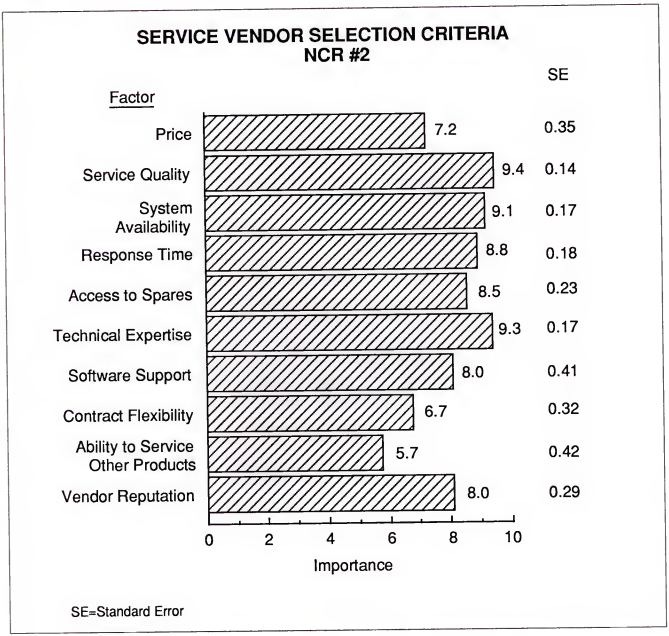



Exhibit IV-2 displays the contract coverage for this group. Sixty percent of the users have Monday through Friday coverage and fifty-five percent have single shift coverage. This compares with the Monday through Friday coverage of seventy percent and the single shift coverage of seventy-two percent in survey #1. The contract coverage for all other vendors combined is sixty-four percent Monday through Friday, and fifty-six percent single shift.

EXHIBIT IV-2

**CONTRACT COVERAGE**
**NCR #2**

| | 1989 Percent of Sample |
|---|---|
| Days Covered | |
| Monday - Friday | 60 |
| Monday - Saturday | 0 |
| Monday - Sunday | 40 |
| Hours Covered | |
| 1 - 9 Hours | 55 |
| Other | 3 |
| 16 - 24 | 42 |

The average number of system interruptions per month for this sample (.28) is about half the number of interruptions reported in survey #1, and for all other vendors combined, as shown in Exhibit IV-3. Users reported that fifty-seven percent of these interruptions were caused by difficulties with hardware. This compares to the sample of all other vendors combined, which reported sixty-three percent of interruptions were caused by hardware failures.

EXHIBIT IV-3

**SYSTEM INTERRUPTION ANALYSIS**
**NCR #2**

| | 1989 | |
|---|---|---|
| | Mean | SE |
| System Interruptions per Month | .28 | .05 |
| Hardware-Caused (%) | 57 | 7 |
| System-Software-Caused (%) | 11 | 4 |
| Application-Software-Caused (%) | 8 | 3 |
| Other-Caused (%) | 24 | 6 |

SE=Standard Error

Exhibit IV-4 presents an analysis of system availability performance items. NCR met the average system availability requirements of the users in this sample, but clearly did not meet the response time expectations of these users. Repair time received of 6.7 hours also exceeded the user expectations of 5.0 hours. One user in this sample reported a 48-hour repair time.

EXHIBIT IV-4

**SYSTEM AVAILABILITY PERFORMANCE ANALYSIS NCR #2**

| Performance Criteria | Required | | Received | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Availability (%) | 97.3 | 0.98 | 97.4 | 0.66 |
| Response Time (Hrs.) | 3.7 | 0.71 | 6.1 | 1.58 |
| Repair Time (Hrs.) | 5.0 | 1.22 | 6.7 | 1.76 |

SE=Standard Error

Fifty-eight percent of the users were satisfied with system availability, as shown in Exhibit IV-5. This is about the same as that reported by all other vendors combined and significantly higher than the thirty percent satisfied, reported by the users in survey #1. The seventy-four percent satisfied with response time and repair time is significantly lower than the ninety and ninety-one percent satisfied, reported in the sample of all other vendors combined.

EXHIBIT IV-5

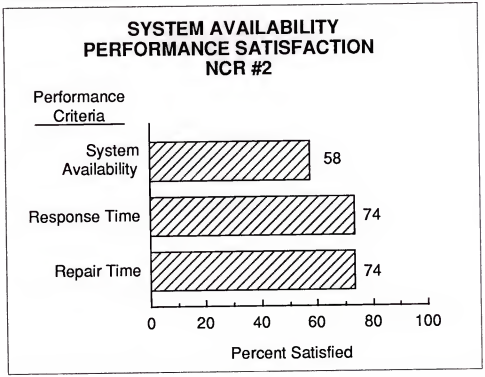
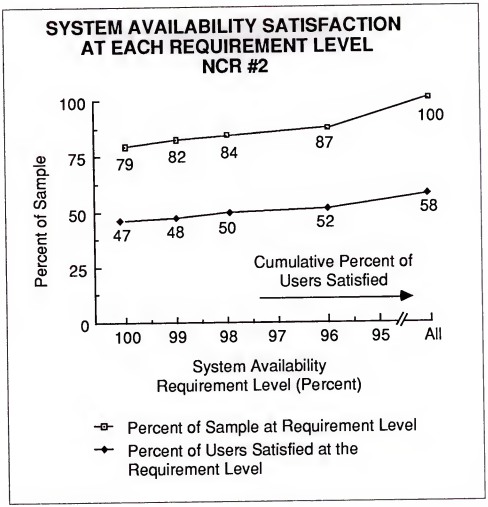


Exhibit IV-6 displays system availability satisfaction at various requirement levels. Seventy-nine percent of the users in this sample require 100% availability, compared with fifty-eight percent in the sample of all other vendors combined. NCR satisfied forty-seven percent of the users who required 100% availability, which is much higher than the thirty-five percent satisfied in the sample of all other vendors combined.

EXHIBIT IV-6




Hardware maintenance requirements are slightly higher for NCR than for all other vendors combined. The requirement level for hardware remote support of 8.9, on a scale of 1 to 10, is significantly higher than all other vendors combined, which has a requirement of 7.8, as shown in Exhibit IV-7. NCR gets high marks for remote support, however, with 8.7 compared to 7.3 for all other vendors combined. This is further demonstrated by the eighty-four percent of satisfied users in this category compared with sixty-three percent of satisfied users in the sample of all other users combined. Spares availability, with only forty-nine percent of the users satisfied, is certainly an area that deserves more attention.

EXHIBIT IV-7

## HARDWARE MAINTENANCE REQUIRED VERSUS RECEIVED NCR #2

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | HW Engineer Skill | 9.1 | 0.2 | 8.4 | 0.2 |
| B | HW Remote Support | 8.9 | 0.3 | 8.7 | 0.3 |
| C | Spare Parts | 9.2 | 0.2 | 8.1 | 0.3 |
| D | HW Maintenance Overall | 9.3 | 0.1 | 8.6 | 0.2 |

SE=Standard Error

EXHIBIT IV-8

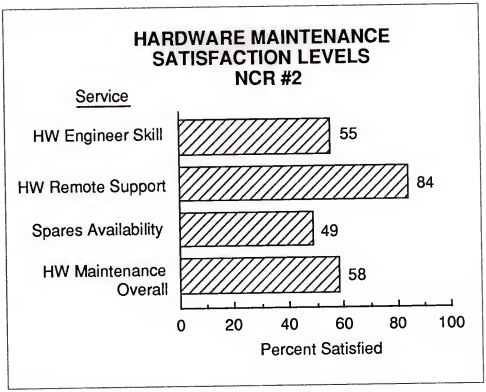


Exhibit IV-9 presents a comparison of the software support requirements with the software support received. As was the case in other areas, the NCR users have a higher requirement for software support than the average of all other vendors combined. NCR has responded, however, by providing a higher level of support. Software documentation and operational training stand out as two areas where the service received falls far short of what is expected by the users. This is highlighted in Exhibit IV-10, where only thirty-three percent of the users are satisfied with operational training, and only fifty-five percent of the users are satisfied with software documentation.

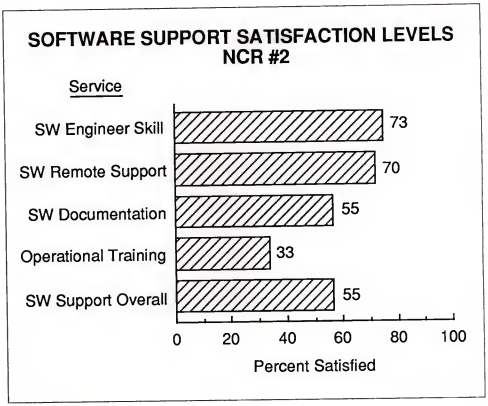
EXHIBIT IV-9

**SOFTWARE SUPPORT REQUIRED VERSUS RECEIVED NCR #2**

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | SW Engineer Skill | 8.8 | 0.3 | 8.4 | 0.3 |
| B | SW Remote Support | 9.0 | 0.4 | 8.6 | 0.3 |
| C | SW Documentation | 8.9 | 0.3 | 7.8 | 0.5 |
| D | Operational Training | 8.6 | 0.6 | 6.7 | 0.8 |
| E | SW Support Overall | 9.2 | 0.3 | 8.5 | 0.3 |

SE=Standard Error

EXHIBIT IV-10




NCR users also seem to have a slightly higher requirement for ancillary services than the average of all other vendors combined. In the area of network design and planning, however, the requirement of 8.3 is much higher than the 6.6 reported by the average of all other vendors combined. NCR users reported that they received a service level of only 6.5 in this area, which is far short of what users say they need.

EXHIBIT IV-11

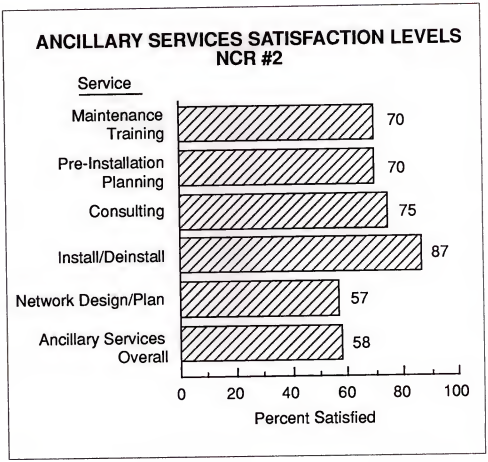
## ANCILLARY SERVICES REQUIRED VERSUS RECEIVED NCR #2

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | Maintenance Training | 6.1 | 0.7 | 6.0 | 0.8 |
| B | Pre-Installation Planning | 7.8 | 0.6 | 7.4 | 0.5 |
| C | Consulting | 8.4 | 0.5 | 8.1 | 0.4 |
| D | Install/Deinstall | 7.7 | 0.5 | 7.7 | 0.4 |
| E | Network Design/ Planning | 8.3 | 0.6 | 6.5 | 0.9 |
| F | Ancillary Services Overall | 7.8 | 0.4 | 7.0 | 0.4 |

SE=Standard Error

The satisfaction levels for ancillary services are displayed in Exhibit IV-12. Network design and planning with fifty-seven percent of users satisfied, appears to be the major factor contributing to the fifty-eight percent satisfied with the ancillary services overall rating.

EXHIBIT IV-12



# NCR Surveys Combined

# NCR Surveys Combined

The combined sample represents seventy-one users of the 32-600, five users of the 32-650, three users of the 32-400 and one user of the 32-800.

Forty-one of the users were from the medical industry, ten from process manufacturing, five from the education industry and the remainder spread across other industry groups.

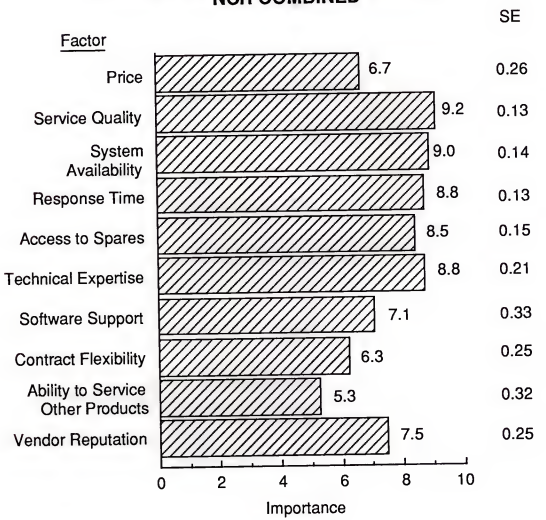
Service quality, with a rating of 9.2, is the most important factor in selecting a service vendor, as shown in Exhibit V-1. System availability, with an importance factor of 9.0, is also ranked very high by NCR users in this sample.

Exhibit V-2 displays the contract coverage of the users in this sample. The percentage of users with Monday through Friday coverage is about the same as for all other users combined, while the percentage of users with single-shift coverage is slightly higher than that reported by the average of all other users combined.

NCR users report a lower number of system interruptions per month, and a lower percent of these interruptions due to hardware, than the average of all other vendors combined. Exhibit V-3 reveals that the users in this sample report an average of .45 system interruptions per month and that fifty-six percent of these are due to hardware problems.

The analysis of system availability performance is presented in Exhibit V-4. The mean system availability required and received is very similar in this sample to that of all other vendors combined, if the standard error of the means of both samples is considered. The response time and repair time required for the NCR samples are higher than that of all other vendors combined, and NCR falls short of meeting its users' expectations in these areas.

EXHIBIT V-1




SE=Standard Error

EXHIBIT V-2

## CONTRACT COVERAGE
## NCR COMBINED

| | 1989 Percent of Sample |
|---|---|
| Days Covered | |
| Monday - Friday | 65 |
| Monday - Saturday | 0 |
| Monday - Sunday | 35 |
| Hours Covered | |
| 1 - 9 Hours | 63 |
| 10 - 16 | 1 |
| 17 - 24 | 36 |

EXHIBIT V-3

## SYSTEM INTERRUPTION ANALYSIS
## NCR COMBINED

| | 1989 | |
|---|---|---|
| | Mean | SE |
| System Interruptions per Month | 0.45 | 0.097 |
| Hardware-Caused (%) | 56 | 5 |
| System-Software-Caused (%) | 15 | 3 |
| Application-Software-Caused (%) | 9 | 3 |
| Other-Caused (%) | 20 | 4 |

SE=Standard Error

EXHIBIT V-4

## SYSTEM AVAILABILITY PERFORMANCE ANALYSIS NCR COMBINED

| Performance Criteria | Required | | Received | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Availability (%) | 97.9 | 0.67 | 97.1 | 0.54 |
| Response Time (Hrs.) | 3.4 | 0.66 | 4.8 | 0.53 |
| Repair Time (Hrs.) | 4.4 | 0.76 | 6.9 | 1.32 |

SE=Standard Error

Exhibit V-5 displays the percent of users satisfied with system availability, response time and repair time. NCR is lower in the percent of users satisfied with system availability (45% vs. 56%) compared to all other vendors combined. It is also about fifteen percent lower in the percent of satisfied users in the area of response time and repair time, compared to all other vendors combined.

System availability satisfaction at various requirement levels is displayed in Exhibit V-6. Eighty percent of the NCR users require 100% availability. This compares with fifty-eight percent of the users in the sample of all other vendors combined. NCR manages to satisfy thirty-three percent of the users who require 100% availability. This compares to thirty-five percent of satisfied users in the sample of all other vendors combined.

Exhibit V-7 compares the requirements of the key hardware maintenance items with the level of service that the users say they have received. The NCR users' requirements are all above 9.1, which is high compared to the requirements of all other users combined. NCR does not meet these requirements in any category, but the worst problem appears to be in the area of spare parts availability, where the requirement is 9.4 and the users report receiving only 7.8.

Spares availability is also highlighted as a key problem, considering the thirty-four percent of satisfied users displayed in Exhibit V-8. Fifty-four percent of the sample of all other users are satisfied with parts availability.

EXHIBIT V-5

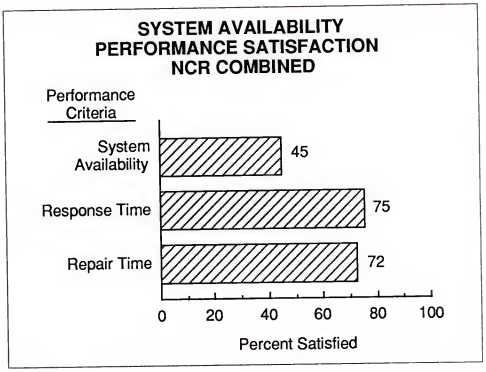



EXHIBIT V-6

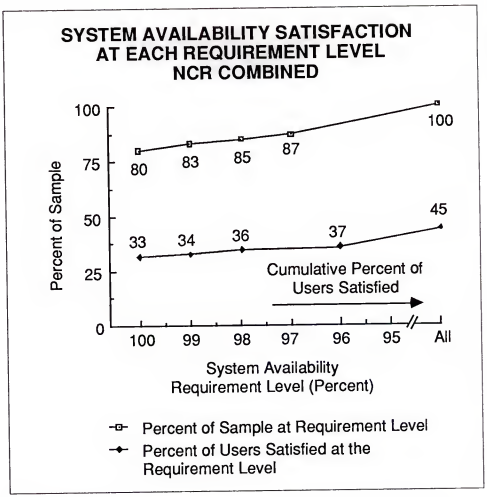


EXHIBIT V-7

## HARDWARE MAINTENANCE REQUIRED VERSUS RECEIVED NCR COMBINED

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | HW Engineer Skill | 9.4 | 0.1 | 8.2 | 0.2 |
| B | HW Remote Support | 9.2 | 0.2 | 8.2 | 0.2 |
| C | Spare Parts | 9.4 | 0.1 | 7.8 | 0.2 |
| D | HW Maintenance Overall | 9.5 | 0.1 | 8.5 | 0.1 |

SE=Standard Error

EXHIBIT V-8

## HARDWARE MAINTENANCE SATISFACTION LEVELS NCR COMBINED

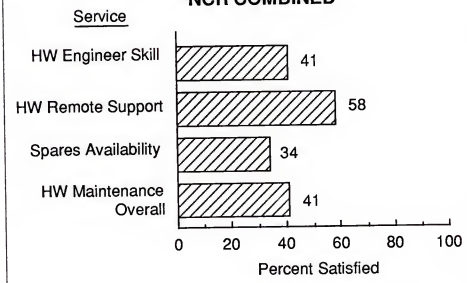


Exhibit V-9 displays the software support requirements of NCR users and the level of support received in response to these requirements. Requirements for all areas of software support, except operational training, were above 9.0. The operational training requirement was at 7.9. The average level of support received did not meet the requirement in any area, but the two areas with the worst performance are software documentation and operational training. NCR users receive a higher level of software support than the average of all other vendors in all areas except software documentation and operational training.

The percent of users satisfied with software support is displayed in Exhibit V-10. The percentage is fifty percent or lower in all categories, with software documentation at thirty-two percent being the lowest. The thirty-three percent satisfied with overall software support in this sample compares with fifty-one percent satisfied in the sample of all other vendors combined.

Exhibit V-11 displays a comparison of the ancillary services requirements and the service received. NCR did not meet the average requirement in any category. The major problem area is network design and planning, where the requirement is 7.1 and the service level received is 5.7.

EXHIBIT V-9

**SOFTWARE SUPPORT REQUIRED VERSUS RECEIVED NCR COMBINED**

| | | Required | | Received | |
|---|---|---|---|---|---|
| Key | Service | Mean | SE | Mean | SE |
| A | SW Engineer Skill | 9.2 | 0.2 | 8.0 | 0.3 |
| B | SW Remote Support | 9.1 | 0.3 | 7.9 | 0.3 |
| C | SW Documentation | 9.1 | 0.2 | 6.8 | 0.4 |
| D | Operational Training | 7.9 | 0.6 | 5.8 | 0.6 |
| E | SW Support Overall | 9.3 | 0.2 | 7.6 | 0.3 |

SE=Standard Error

EXHIBIT V-10

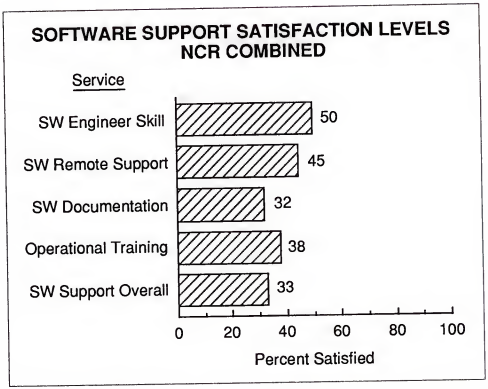



EXHIBIT V-11

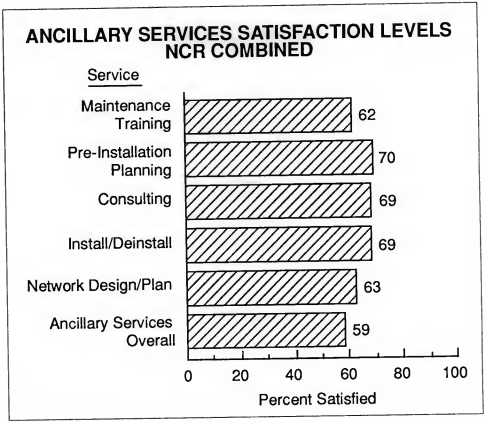
**ANCILLARY SERVICES REQUIRED VERSUS RECEIVED NCR COMBINED**

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | Maintenance Training | 6.3 | 0.5 | 5.5 | 0.5 |
| B | Pre-Installation Planning | 7.6 | 0.4 | 6.4 | 0.5 |
| C | Consulting | 7.3 | 0.4 | 6.5 | 0.4 |
| D | Install/Deinstall | 7.9 | 0.4 | 7.3 | 0.4 |
| E | Network Design/ Planning | 7.1 | 0.5 | 5.7 | 0.5 |
| F | Ancillary Services Overall | 7.8 | 0.3 | 6.9 | 0.3 |

SE=Standard Error

The percent of users satisfied with ancillary services is shown in Exhibit V-12. The NCR results are very similar to the results of all other vendors combined.

EXHIBIT V-12



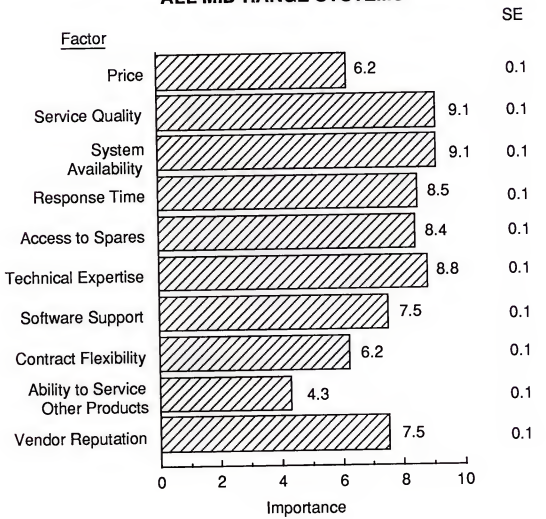

# All Other Vendors Summary Data

# All Other Vendors Summary Data

This chapter presents summary data obtained from surveying 399 users of AT&T, Concurrent, Data General, DEC, Hewlett Packard, IBM, Prime and Wang Mid-Range systems.

The information is presented in the same format as the NCR information contained in chapters III, IV and V so that it will be useful in making comparisons with the NCR results.

EXHIBIT VI-1




SE=Standard Error

EXHIBIT VI-1

## CONTRACT COVERAGE
## ALL MID-RANGE SYSTEMS

| | 1989 Percent of Sample | 1988 Percent of Sample |
|---|---|---|
| Days Covered | | |
| Monday - Friday | 64 | 66 |
| Monday - Saturday | 3 | 4 |
| Monday - Sunday | 33 | 30 |
| Hours Covered | | |
| 1 - 9 Hours | 56 | 54 |
| 10 - 16 | 13 | 14 |
| 17 - 24 | 31 | 32 |

EXHIBIT VI-2

## SYSTEM INTERRUPTION ANALYSIS
## ALL MID-RANGE SYSTEMS

| | 1989 | | 1988 | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Interruptions per Month | .59 | 0.06 | 1.20 | 0.10 |
| Hardware-Caused (%) | 63 | 2 | 56 | 2 |
| System-Software-Caused (%) | 13 | 1 | 15 | 2 |
| Application-Software-Caused (%) | 4 | 1 | 8 | 2 |
| Other-Caused (%) | 20 | 2 | 21 | 3 |

SE=Standard Error

EXHIBIT VI-4

## SYSTEM AVAILABILITY PERFORMANCE ANALYSIS ALL MID-RANGE SYSTEMS

| Performance Criteria | Required | | Received | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| System Availability (%) | 97.5 | 0.3 | 97.4 | 0.2 |
| Response Time (Hrs.) | 4.5 | 0.3 | 3.9 | 0.3 |
| Repair Time (Hrs.) | 4.7 | 0.4 | 4.0 | 0.4 |

SE=Standard Error

EXHIBIT VI-5

## SYSTEM AVAILABILITY PERFORMANCE SATISFACTION ALL MID-RANGE SYSTEMS

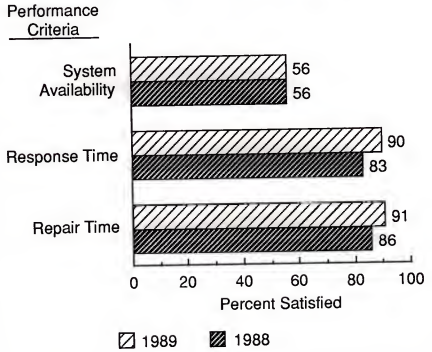


EXHIBIT VI-6

## SYSTEM AVAILABILITY SATISFACTION AT EACH REQUIREMENT LEVEL ALL MID-RANGE SYSTEMS

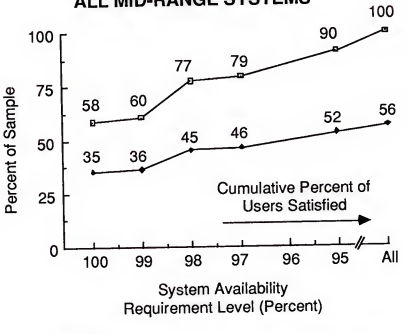



EXHIBIT VI-7

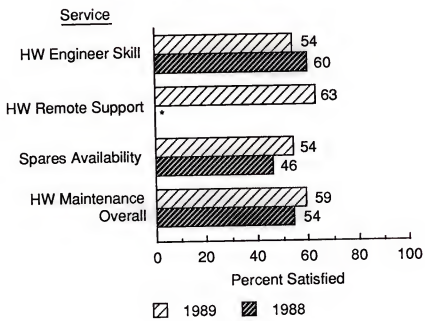
## HARDWARE MAINTENANCE REQUIRED VERSUS RECEIVED ALL MID-RANGE SYSTEMS

| | | Required | | Received | |
|---|---|---|---|---|---|
| Key | Service | Mean | SE | Mean | SE |
| A | HW Engineer Skill | 8.9 | 0.1 | 8.3 | 0.1 |
| B | HW Remote Support | 7.8 | 0.2 | 7.3 | 0.1 |
| C | Spare Parts | 8.8 | 0.1 | 8.1 | 0.1 |
| D | HW Maintenance Overall | 9.0 | 0.1 | 8.5 | 0.1 |

SE=Standard Error

EXHIBIT VI-8

## HARDWARE MAINTENANCE SATISFACTION LEVELS ALL MID-RANGE SYSTEMS




* Not Available

EXHIBIT VI-9

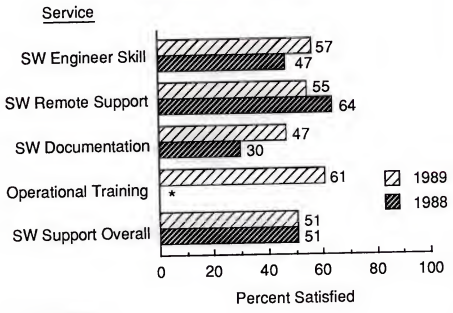
## SOFTWARE SUPPORT REQUIRED VERSUS RECEIVED ALL MID-RANGE SYSTEMS

| | | Required | | Received | |
|---|---|---|---|---|---|
| Key | Service | Mean | SE | Mean | SE |
| A | SW Engineer Skill | 8.7 | 0.1 | 7.5 | 0.1 |
| B | SW Remote Support | 8.0 | 0.2 | 7.1 | 0.2 |
| C | SW Documentation | 8.4 | 0.1 | 7.2 | 0.1 |
| D | Operational Training | 7.1 | 0.2 | 6.3 | 0.2 |
| E | SW Support Overall | 8.5 | 0.1 | 7.5 | 0.1 |

SE=Standard Error

EXHIBIT VI-10

**SOFTWARE SUPPORT SATISFACTION LEVELS**
**ALL MID-RANGE SYSTEMS**




*Not Available

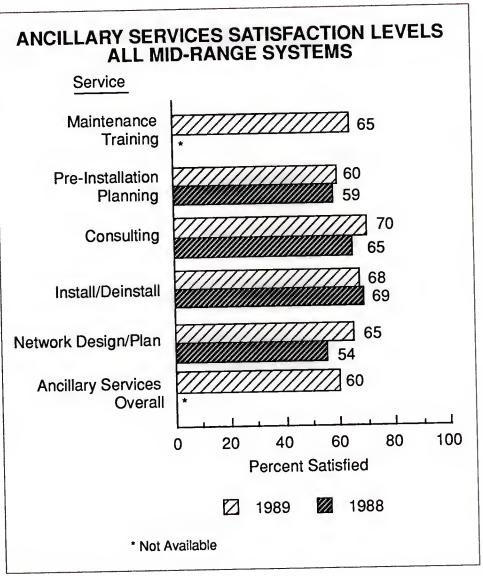
EXHIBIT VI-11

**ANCILLARY SERVICES**
**REQUIRED VERSUS RECEIVED**
**ALL MID-RANGE SYSTEMS**

| Key | Service | Required | | Received | |
|---|---|---|---|---|---|
| | | Mean | SE | Mean | SE |
| A | Maintenance Training | 5.5 | 0.2 | 4.7 | 0.2 |
| B | Pre-Installation Planning | 7.4 | 0.2 | 6.8 | 0.2 |
| C | Consulting | 6.3 | 0.2 | 5.8 | 0.2 |
| D | Install/Deinstall | 8.1 | 0.1 | 7.5 | 0.1 |
| E | Network Design/ Planning | 6.6 | 0.2 | 5.8 | 0.2 |
| F | Ancillary Services Overall | 7.8 | 0.1 | 7.0 | 0.1 |

SE=Standard Error

EXHIBIT VI-12



# Appendix: Questionnaire

# Appendix: Questionnaire

As listed on "call sheets," confirm with respondent:

1. CPU manufacturer _____

2. Model _____

We'd like to focus our questions on your (manufacturer/model as listed) system. Is that system still in use there? (If no, terminate interview.)

Please keep the service you receive for this system's CPU in mind throughout the survey.

**First, some background information:**

3. Who provides maintenance service for this CPU? (read list; check one):
   a. The manufacturer ❑
   b. A third-party maintainer ❑

   If third-party maintenance (TPM):
   Please specify TPM company: _____
   *If third-party, thank respondent and terminate interview here.*

4. Regarding the maintenance coverage on this CPU:
   a. Does your contract cover service (read list; check one):
      1) 5 days a week ❑
      2) 7 days a week ❑
      3) Other? (please specify) _____

   b. 1) 8 hours per day ❑
      2) 16 hours per day ❑
      3) 24 hours per day ❑
      4) Other? (please specify) ❑

**Now we'd like to ask a few questions about how you chose your service vendor.**

5. I have a list here of different aspects of the service decision. As I read through them, would you please rate the importance of each criterion in the selection of your service vendor?
On a scale of one to ten (ten being highest), what was the importance of (read list):

| Factor | Importance (1-10) |
|---|---|
| a. Price | _____ |
| b. Service quality | _____ |
| c. System availability | _____ |
| d. Response time on a service call | _____ |
| e. Access to spare parts | _____ |
| f. Technical expertise | _____ |
| g. Software support | _____ |
| h. Contract flexibility | _____ |
| i. Ability to service other vendors' products | _____ |
| j. Vendor reputation | _____ |

**Now, some questions about your basic support requirements.**

6. Over the past twelve months, how many system interruptions (system failures) did you average per month? _____/month

7. What percent of these interruptions were caused by:

| | percent |
|---|---|
| a. Hardware failure | _____ |
| b. System software | _____ |
| c. Application software | _____ |
| d. Other (i.e., user error, environmental disruption, etc.) | _____ |

Note: total should equal 100%

8. a. What percent system availability ("uptime") do you require? _____
b. What percent system availability do you actually receive? _____

9. If response time is defined as the time it takes a field engineer to arrive at your site after you place a trouble call:
a. What response time do you require? _____ hours
b. What is the average response you receive? _____ hours

10. If repair time is defined as the amount of time it takes on average to have your system up and running after the field engineer arrives:
a. What repair time do you require? _____ hours
b. What repair time do you receive on average? _____ hours

11. For the following list of hardware maintenance services, can I have you rate (again on a scale of one to ten):
First, the level of service you require; then, the level of service you're actually receiving in each area.
Let's start with (read list):

| | 1. Required (1-10) | 2. Received |
|---|---|---|
| a. Hardware engineer skill level | _____ | _____ |
| b. Hardware remote support | _____ | _____ |
| c. Spare parts availability | _____ | _____ |
| d. Hardware maintenance overall | _____ | _____ |

12. Do you receive software support from your CPU manufacturer as well? (check one)
Yes _____ (If yes, proceed to question 13.)
No _____ (If no, skip to question 15.)

13. For this software support, please rate your requirements and what you've received in terms of (read list):

| | 1. Required (1-10) | 2. Received |
|---|---|---|
| a. Software engineer skill level | _____ | _____ |
| b. Software remote support | _____ | _____ |
| c. Software documentation | _____ | _____ |
| d. Operational training | _____ | _____ |
| e. Software support overall | _____ | _____ |

14. Defining a "major" software problem as one in which all processing is prevented, and a "minor" problem as one that allows continued processing with some degradation, over the past twelve months:
    a. How many major software problems were reported, on average, per month?
    _____ /month
    b. How many minor software problems were reported on average, per month?
    _____ /month
    c. What was the average turnaround, in hours (based on 24-hour day), for major problem resolution? _____ hours
    d. What was the average turnaround, in hours (based on 24-hour day), for minor problem resolution? _____ hours

**Now, if we can ask a couple questions about support beyond normal maintenance (or ancillary) services:**

15. For the following ancillary support services, could you please rate (1-10) your requirement for each service, and then the level of service you're currently receiving?

| | 1. Required (1-10) | 2. Received (1-10) |
|---|---|---|
| a. Maintenance-related training | _____ | _____ |
| b. Preinstallation planning services (i.e., environmental, site, and installation planning) | _____ | _____ |
| c. Consulting | _____ | _____ |
| d. Installations/deinstallations/ moves | _____ | _____ |
| e. Network design/planning | _____ | _____ |
| f. Ancillary services overall | _____ | _____ |

**That about covers it! Thanks for your patience.**

16. To wrap this up, can I ask what you consider to be your single most pressing service concern at this time?

17. If you could choose one additional service that your vendor is not currently providing, what would that be?

18. Finally, we would like to ask if you would object to this information being released to NCR if it is requested. Yes ___ No ___

    If Yes, say "Please rest assured that this information will be kept **strictly** confidential."

Thanks very much for your time. You've been a great help!